

U.S. Patent Application Serial No. 10/649,732  
Amendment filed August 15, 2007  
Reply to OA dated May 16, 2007

**AMENDMENTS TO THE CLAIMS:**

Please amend claims 12, 15, and 22, as follows. This listing of claims will replace all prior versions, and listings, of claims in the application:

**Listing of Claims:**

Claims 1-11 (Canceled).

Claim 12 (Currently amended): A method of producing a microporous polyolefin membrane, comprising the steps of extruding a solution composed of 10 to 50 weight % of (A) a polyolefin having a weight-average molecular weight of  $5 \times 10^5$  or more or (B) a composition containing this polyolefin and 50 to 90 weight % of a solvent, into a gel-like formed article and removing the solvent therefrom, wherein a treatment step ~~with~~ comprising directly bringing the gel-like formed article into contact with a hot solvent is performed ~~on the gel-like formed article~~.

Claim 13 (Original): The method of producing a microporous polyolefin membrane according to Claim 12, wherein said treatment step with a hot solvent is effected at from the crystal dispersion temperature to melting point plus  $10^\circ\text{C}$  of said (A) polyolefin or (B) polyolefin composition.

U.S. Patent Application Serial No. **10/649,732**  
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Claim 14 (Previously Presented): The method of producing a microporous polyolefin membrane according to Claim 12, wherein said treatment step with a hot solvent is effected prior to said step of removing the solvent.

Claim 15 (Currently amended): A method of producing a microporous polyolefin membrane, comprising the steps of extruding a solution composed of 10 to 50 weight % of (A) a polyolefin having a weight-average molecular weight of  $5 \times 10^5$  or more or (B) a composition containing this polyolefin and 50 to 90 weight % of a solvent, into a gel-like formed article and removing the solvent therefrom, wherein a treatment step with a hot solvent is performed on the gel-like formed article ~~The method of producing a microporous polyolefin membrane according to Claim 12, and~~ wherein said treatment step with a hot solvent is effected subsequent to said step of removing the solvent.

Claim 16 (Previously Presented): The method of producing a microporous polyolefin membrane according to Claim 12, wherein said polyolefin (A) has a weight-average molecular weight of  $1 \times 10^6$  to  $15 \times 10^6$ .

Claim 17 (Previously Presented): The method of producing a microporous polyolefin membrane according to Claim 12, wherein said polyolefin composition (B) is composed of an ultra-

U.S. Patent Application Serial No. **10/649,732**  
Amendment filed August 15, 2007  
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high-molecular-weight polyolefin having a weight-average molecular weight of  $1 \times 10^6$  to  $15 \times 10^6$  and a polyolefin having a weight-average molecular weight of  $1 \times 10^5$  or more but less than  $1 \times 10^6$ .

Claim 18 (Previously Presented): The method of producing a microporous polyolefin membrane according to Claim 12, wherein said polyolefin composition (B) contains an ultra-high-molecular-weight polyolefin having a weight-average molecular weight of  $7 \times 10^5$  or more at 1 weight % or more.

Claim 19 (Previously Presented): The method of producing a microporous polyolefin membrane according to Claim 12, wherein said polyolefin (A) or polyolefin composition (B) has a weight-average molecular weight/number-average molecular weight ratio ( $M_w/M_n$ ) of 300 or less.

Claim 20 (Previously Presented): The method of producing a microporous polyolefin membrane according to Claim 12, wherein said polyolefin (A) or polyolefin composition (B) has a weight-average molecular weight/number-average molecular weight ratio ( $M_w/M_n$ ) of 5 to 50.

Claim 21 (Previously Presented): The method of producing a microporous polyolefin membrane according to Claim 12, wherein said polyolefin (A) or polyolefin for said composition (B) is polypropylene or polyethylene.

Claim 22 (Currently amended): A method of producing a microporous polyolefin membrane, comprising the steps of extruding a solution composed of 10 to 50 weight % of (A) a polyolefin having a weight-average molecular weight of  $5 \times 10^5$  or more or (B) a composition containing this polyolefin and 50 to 90 weight % of a solvent, into a gel-like formed article and removing the solvent therefrom, wherein a treatment step with a hot solvent is performed on the gel-like formed article ~~The method of producing a microporous polyolefin membrane according to Claim 12, and~~

wherein the average pore size (a) in the area from the surface to a depth of  $d/16$  (d: thickness of said membrane) is 0.05 to 50  $\mu\text{m}$ , and the average pore size (b) in the other area is 0.01 to 30  $\mu\text{m}$ , where the relationship  $(b) < (a)$  holds.

Claim 23 (Previously Presented): The method of producing a microporous polyolefin membrane according to Claim 12, wherein said polyolefin composition (B) is composed of a polyolefin having a weight-average molecular weight of  $5 \times 10^5$  or more and polyolefin having a weight-average molecular weight of 1,000 to 4,000 and melting point of 80 to 130°C.

Claim 24 (Previously Presented): The method of producing a microporous polyolefin membrane according to Claim 12, wherein said polyolefin composition (B) is composed of (B-1) an ultra-high-molecular-weight polyolefin having a weight-average molecular weight of  $5 \times 10^5$  or more and (B-2) a polyolefin having a weight average molecular weight of less than  $5 \times 10^5$ , the (B-2)/(B-1) weight ratio being 0.2 to 20.

Claim 25 (Previously Presented): The method of producing a microporous polyolefin membrane according to Claim 12, wherein said polyolefin composition (B) is composed of a polyolefin having a weight-average molecular weight of  $5 \times 10^5$  or more and polypropylene having a weight-average molecular weight of  $3 \times 10^5$  or more.

Claim 26 (Previously Presented): The method of producing a microporous polyolefin membrane according to Claim 12, wherein said polyolefin composition (B) is composed of a polyolefin having a weight-average molecular weight of  $5 \times 10^5$  or more and ethylene-based copolymer having a melting point of 95 to 125°C and produced in the presence of a single-site catalyst.

Claim 27 (Previously Presented): The method of producing a microporous polyolefin membrane according to Claim 12, wherein said polyolefin composition (B) is composed of 1 to 69 weight % of an ultra-high-molecular-weight polyolefin having a weight-average molecular weight of  $7 \times 10^5$  or more, 98 to 1 weight % of a high-density polyethylene, and 1 to 30 weight % of a low-density polyethylene.

Claim 28 (Previously Presented): The method of producing a microporous polyolefin membrane according to Claim 12, further comprising the step of stretching said gel-like article.

U.S. Patent Application Serial No. **10/649,732**  
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Claim 29 (Original): The method of producing a microporous polyolefin membrane according to Claim 28, wherein said stretching step is effected at an areal ratio of 15 to 400.

Claim 30 (Withdrawn): A battery separator which uses the microporous polyolefin membrane according to Claim 1.

Claim 31 (Withdrawn): A battery which uses the microporous polyolefin membrane according to Claim 1 for its separator.

Claim 32 (Canceled).

Claim 33 (Previously Presented): The method of producing a microporous polyolefin membrane according to Claim 22, wherein the average pore size (a) in the area from the surface to a depth of  $d/16$  ( $d$ : thickness of said membrane) is 1 to 30  $\mu\text{m}$ , and the average pore size (b) in the other area is 0.03 to 2  $\mu\text{m}$ .